Exchange programme Vrije Universiteit Amsterdam

Vrije Universiteit Amsterdam - Exchange programme Vrije Universiteit Amsterdam - 2024-2025

Exchange

Vrije Universiteit Amsterdam offers many English-taught courses in a variety of subjects, ranging from arts & culture and social sciences, neurosciences and computer science, to economics and business administration.

The International Office is responsible for course approval and course registration for exchange students. For details about course registration, requirements, credits, semesters and so on, please visit the exchange programmes webpages.

Medical Pharmacology

Course Code	AB_1199
Credits	6
Period	P2
Course Level	200
Language Of Tuition	English
Faculty	Faculty of Science
Course Coordinator	dr. M.M.M. Wilhelmus
Examiner	dr. M.M.M. Wilhelmus
Teaching Staff	dr. B. Drukarch, dr. M.M.M. Wilhelmus, C.A.M. Jongenelen
Teaching method(s)	Study Group, Lecture, Practical

Course Objective

Learning objectives:

- the student understands the general mechanisms behind the actions and adverse reactions of pharmaceutical compounds (pharmacodynamics) and can explain these
- the student understands the principles behind the 'receptor theory' and is able to apply its mathematical workings to determine key pharmacodynamic parameters (pD2, pA2, EC50)
- the student is able to describe and explain the ways in which pharmaceutical compounds affect neural stimulus transfer in the central and peripheral nervous system (system pharmacology) and to rationally predict the effects of this on cell and/or organ function.
- the student can describe the processes driving the uptake, distribution, degradation and excretion of pharmaceutical compounds (pharmacokinetics) and the role these processes play in explaining the actions of medications and their toxicity.
- the student can apply relevant mathematical calculations to derive pharmacokinetic key parameters (bio-availability, distribution volume, plasma elimination half-life, clearance) and the relationship between these parameters and explain the dosing schedule of pharmaceutical compounds.
- the student is able to describe the processes and ethical reasoning associated with clinical pharmacological research, design of randomised clinical trials and the different phases within clinical trials
- the student is able to conduct a brief literature search as part of a group and report findings according to academic standards.
- the student acquires practical experience in the preparation, execution and reporting of experimental (pharmacological) research in a laboratory setting.

Scientific thinking and research (Academic skills):
Academic attitude: the student conducts a literature research by reading, analysing and critically reflecting on biomedical literature.
Research: the student independently sets up a scientific experiment, plan and execute it by making use of the existing methodes, and eventually analyse and evaluate the outcome of the experiment.
Academic writing: the student writes a scientific report of the own experiments and present its data.
Presenting: the student presents and defends a scientifically solid presentation of the own data.
Collaboration: the student collaborates with peers during the PBL and practicals and solves problems with the team. In addition, the students actively participates in the team and contributes significantly to the end product of the group.

Course Content

Medical Pharmacology is the science that describes and explains the mode of action of a drug in the body. For the Medical Pharmacology course, the main goal is to obtain insight into the principles and basic concepts of medical pharmacology. In addition, a special emphasis is put on the pharmacology of the (central) nervous system, which closely relates to the parallel course 'Neurosciences'.

Theme 1: Drugs and receptors (pharmacodynamics)

The student is introduced to the concept of pharmacological mode of action and drug target, main effect and adverse effects of drugs and the influence of suggestion, known as the placebo effect. The importance of these concepts in medical practice and in the process of the development of drugs are discussed. In addition, the student gains insight into the basic principles of pharmacodynamics with regard to the mechanism of neuronal

communication in the (central) nervous system, and the effects and side effects of drugs that are targeted towards neurotransmitter receptors in both the brain and periphery, and the physiological and pharmacological meaning of receptor heterogeneity. Students are encouraged to participate in an active manner by preparing themselves for so-called flip-the-classroom sessions (FTCs) in small groups that cover the concept of pharmacodynamics. Students participate in practicals that are centered around the concept of effects of drugs on organ functioning, organs isolated from laboratory animals, and neurotransmitters. Students prepare themselves for these practicals and present a short written report on the results obtained during the practicals to their supervisors.

Themes:

- Pharmacological mode of action and placebo effect
- Drug development
- Receptor theory and dose-response relation
- Receptor-effector relation

Theme 2: The fate of drugs in the body in health and disease (pharmacokinetics).

The student is introduced to the main concepts and basic principles of pharmacokinetics as he/she gains insight into the absorption, distribution, metabolism and elimination of drugs in the body. The student is introduced to the concepts that are central to the working mechanisms of drugs, drug-drug interaction, inter-individual variation, drugs sensitivity and toxicity (“personalized medicine”). Students are encouraged to participate in an active manner by preparing themselves for the FTC session in small student groups “Think for yourself & ask the teacher” with themes that are centered around pharmacokinetics concepts.

Themes:

- Resorption of drugs and passage through biological membranes
- Routes of administration
- Drugs distribution and volume of distribution
- Elimination of drugs
- Time-effect relation and dose schemes
- Variability in drug (re)actions

Theme 3: Clinical pharmacology

The student is introduced to the main concepts of clinical pharmacology, i.e. randomised clinical trials, phases of clinical drug trials and ethics related to clinical drug trials.

Themes:

- Ethics in clinical pharmacology
- Clinical pharmacology

Problem-based learning (PBL)

In small groups, students will conduct a literature survey on the pharmacology of selected drugs. The PBL is centered around the relation between basic pharmacokinetic and pharmacodynamics concepts and ideas, with a focus on main mode of action, side-effects (adverse events) and the pharmacotherapeutic use of the drug in disease states. Students write a fact sheet of their inquiries. During the PBL, several feedback moments with supervisors are scheduled. The quality of the fact sheet of the group is reflected by grading performed by the respective supervisors.

Additional Information Teaching Methods

Knowledge clips and Q&A sessions: approximately 29 clips (approximately 10 hours) and 7 Q&A sessions (14 hours).
FTC sessions: 4 hours (+4 hours self-study)
Practicals: approximately 8 hours (+4 hours self-study)
PBL: approximately 8 hours
Self-study: 116

Method of Assessment

Grading
The final mark is build up as follows:
• PBL assignment (15% of the final mark; is considered as a practical exercise)
• Exam (85% of the final mark)
In order to obtain the final mark, the PBL should be graded with a minimal of 5.5. Practicals are mandatory.

The written exam consists of multiple choice questions.

Literature

Literature for exam: Drukarch & Wilhelmus’s Essentials in Pharmacology, knowledge clips, FTC sessions and practicals.

Additional Information Target Audience

Compulsory course for second-year BSc Biomedical Sciences students.

Custom Course Registration

You need to register yourself for the course via VUnet, including lectures and (partial) exam(s). Registration for all remaining teaching methods via Canvas.